Behavioral characterization of acetaldehyde in C57BL/6J mice: anxiolytic, amnesic and hedonic effects

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It has been postulated that a number of central effects of ethanol are mediated through the action of its first metabolite, acetaldehyde. In particular, acetaldehyde might be involved in the anxiolytic and hedonic effects of ethanol and is therefore believed to play an important role in alcohol abuse. In agreement with this assumption, previous studies indicated that acetaldehyde is mainly reinforcing in rats, which have been shown to readily self-administer acetaldehyde both peripherally and centrally. However, the hedonic effects of acetaldehyde have never been tested in mice, and the possible amnesic and anxiolytic effects of acetaldehyde remain to be elucidated. Therefore, the present studies were aimed at characterizing the anxiolytic, hedonic and amnesic effects of acetaldehyde after its acute peripheral administration to C57BL/6J mice. The effects of intraperitoneal acetaldehyde (0-300 mg/kg) injections were assessed in several classical behavioral tests. The anxiolytic effects were tested with the elevated plus maze, the hedonic effects with the place conditioning procedure and the amnesic effects with the passive avoidance apparatus. Our results show that acetaldehyde dose-dependently altered memory consolidation as evidenced by a reduced performance in the passive avoidance test when acetaldehyde was injected immediately after training at doses between 100 and 300 mg/kg. The elevated plus-maze showed that acetaldehyde, in contrast to ethanol, does not possess anxiolytic properties. Finally, the results of the place conditioning experiment confirmed that acetaldehyde displays significant hedonic properties. The present results add further support to the role of acetaldehyde in ethanol amnesic and hedonic effects but interestingly suggest that acetaldehyde is not involved in ethanol anxiolytic effects.